LP DAAC UWG Meeting
MODIS and VIIRS Status

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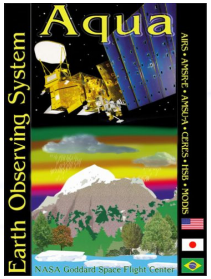
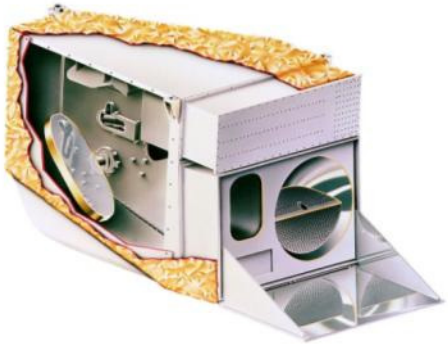
MODIS

- Terra MODIS: over 10 years of successful operation
- Aqua MODIS: over 8 years of successful operation
- Important contributions for studies of the Earth's land, oceans, and atmosphere systems and environmental and climate change

Launch: Dec. 1999
1st Light: Feb. 2000





Launch: May 2002
1st Light: June 2002

MODIS Land Products

Energy Balance Product Suite

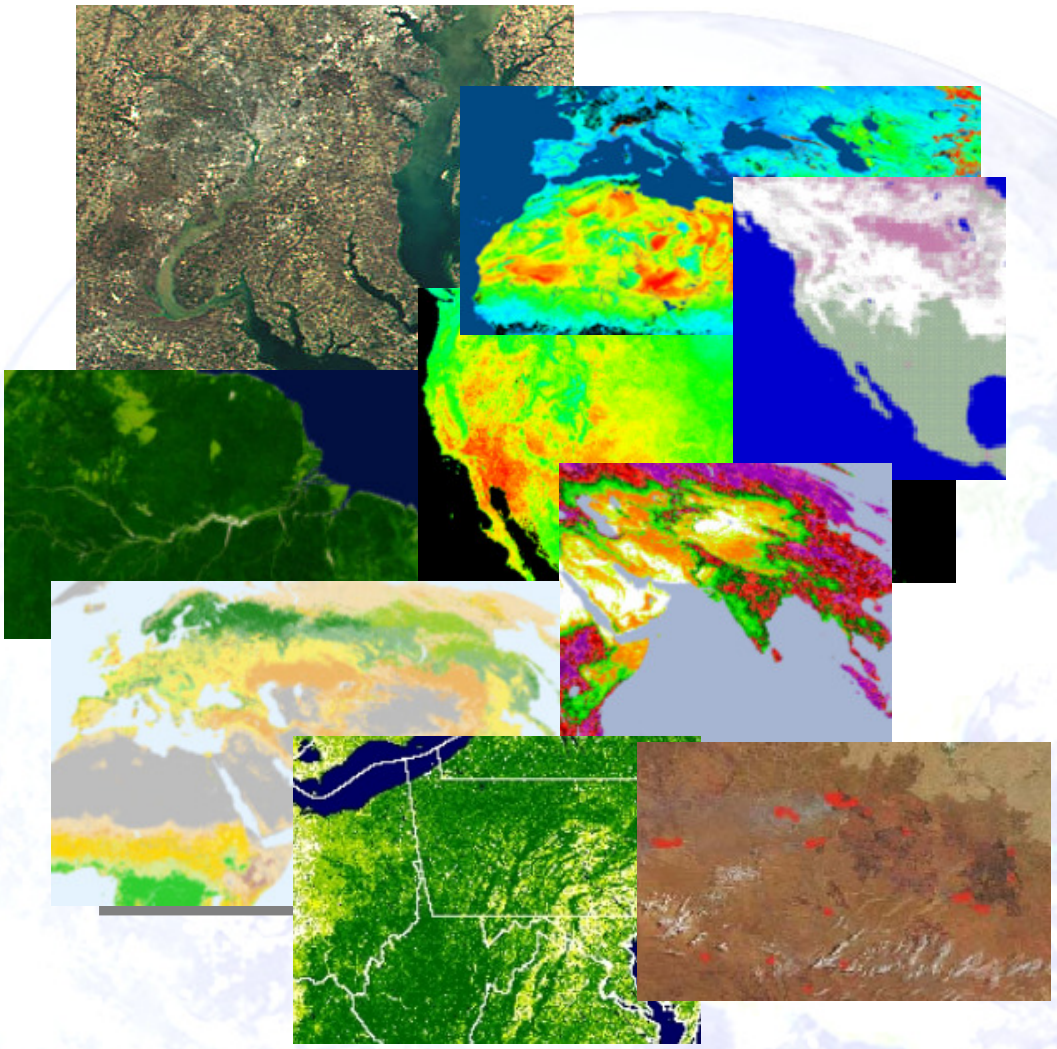
- Surface Reflectance
- Land Surface Temperature, Emmisivity
- BRDF/Albedo
- Snow/Sea-ice Cover

Vegetation Parameters Suite

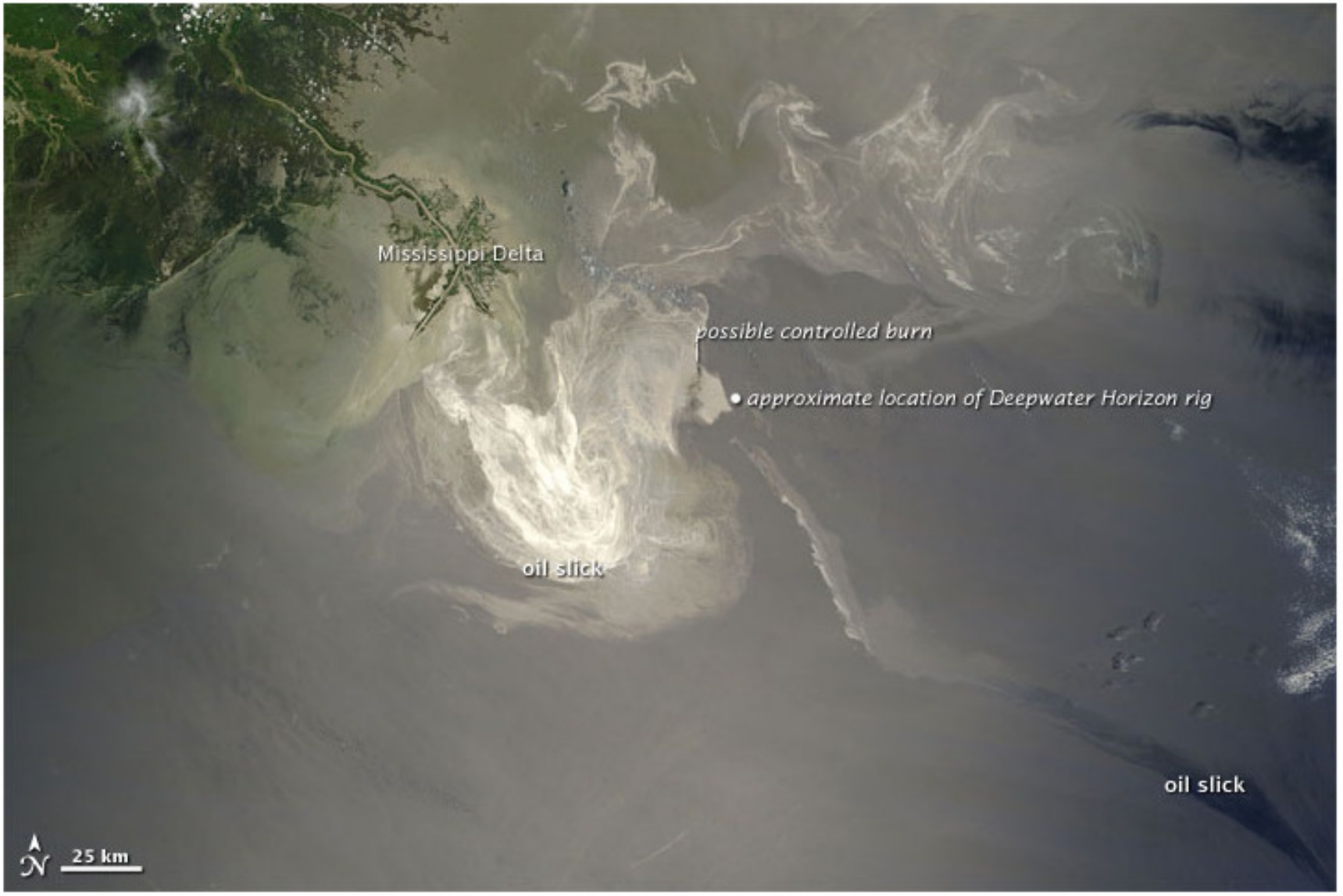
- Vegetation Indices
- LAI/FPAR
- GPP/NPP

Land Cover/Land Use Suite

- Land Cover/Vegetation Dynamics
- Vegetation Continuous Fields
- Fire and Burned Area



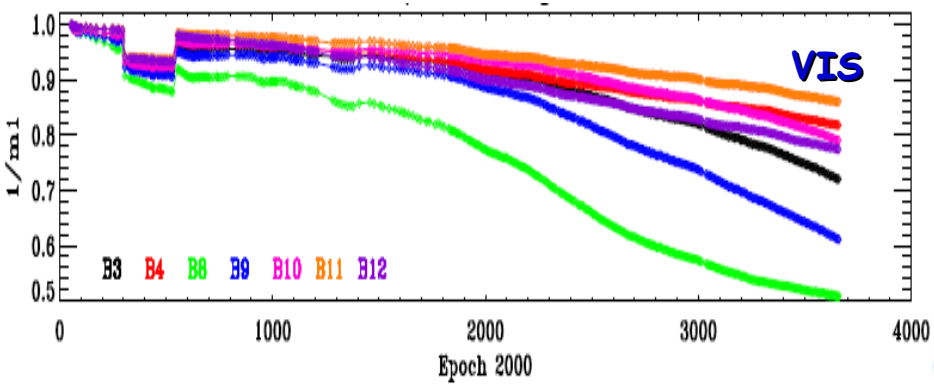
Oil Slick in Gulf of Mexico

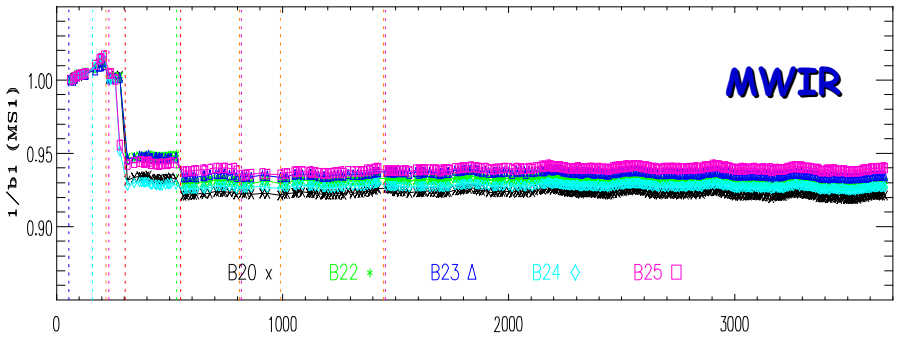


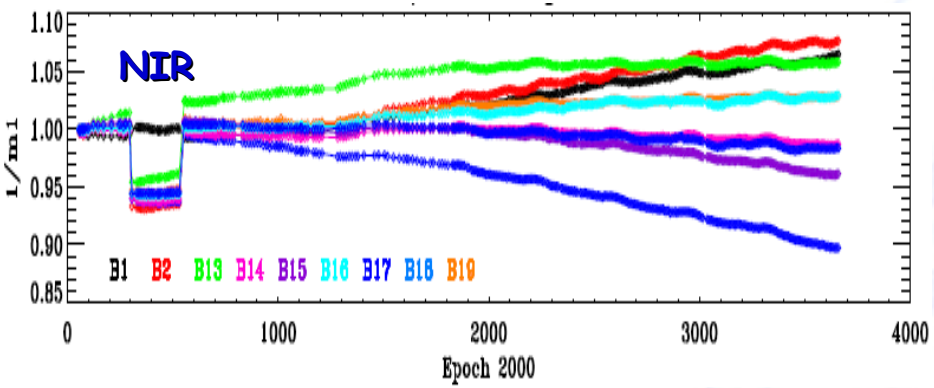
MODIS Terra, Acquired May 24, 2010, Source: Earth Observatory

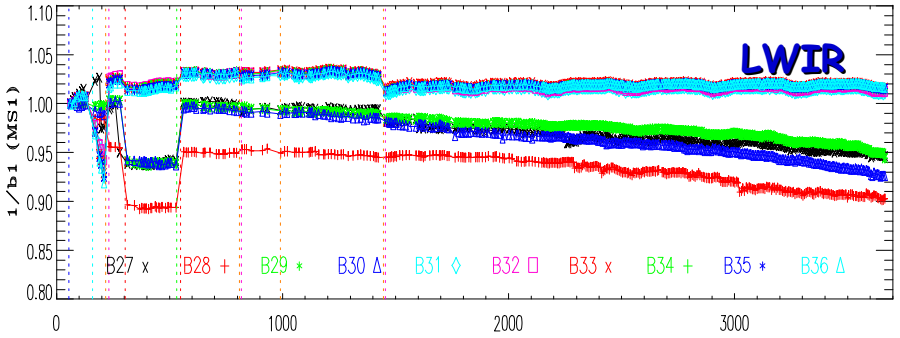
Terra MODIS Radiometry

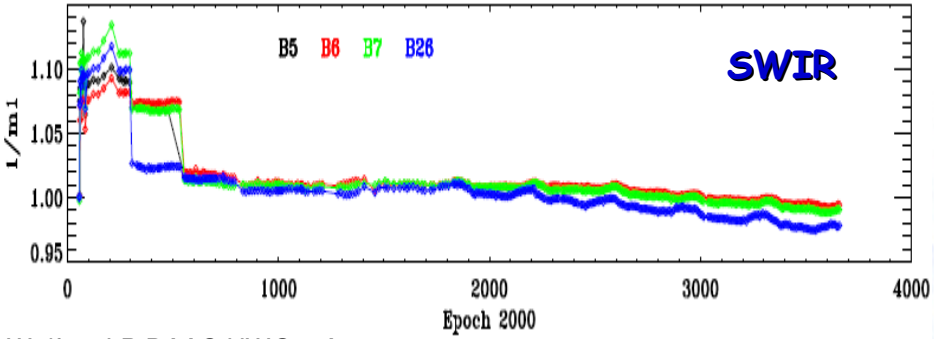
Band averaged, mirror side 1









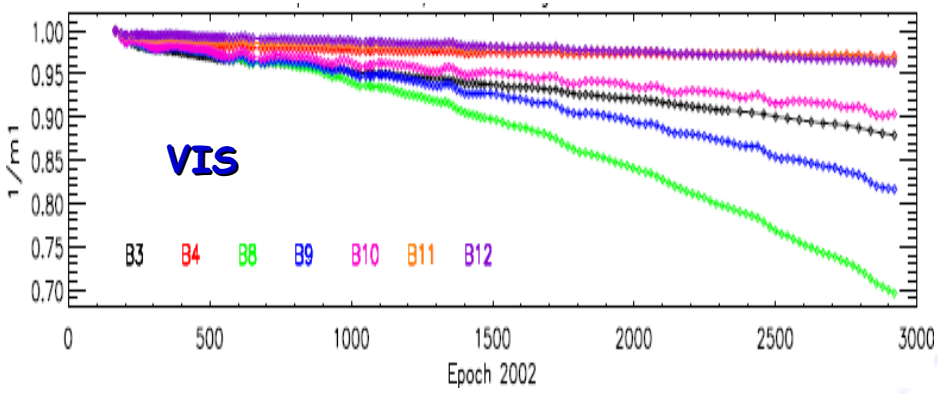


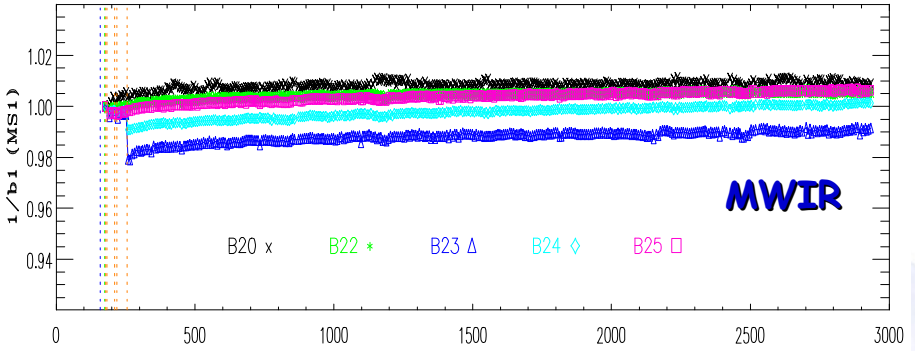
- Changes in VIS: 15-50%
- Changes in NIR: 10%
- Changes in S/M/LWIR: < 5%
- Changes are also mirror side and AOI dependent

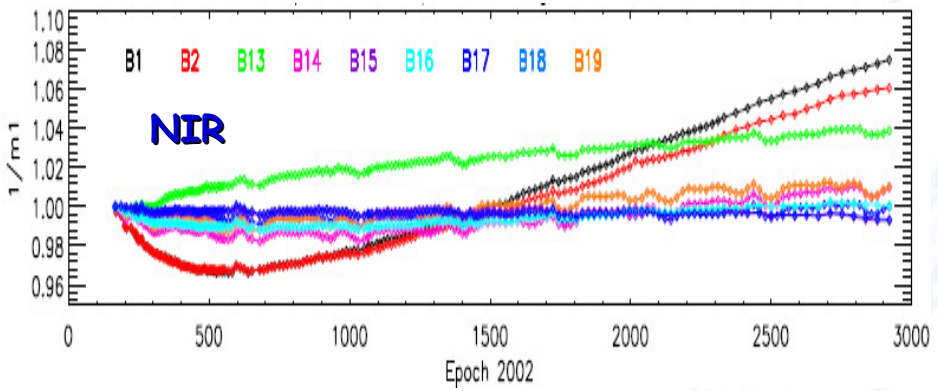
Source: Xiong et al.

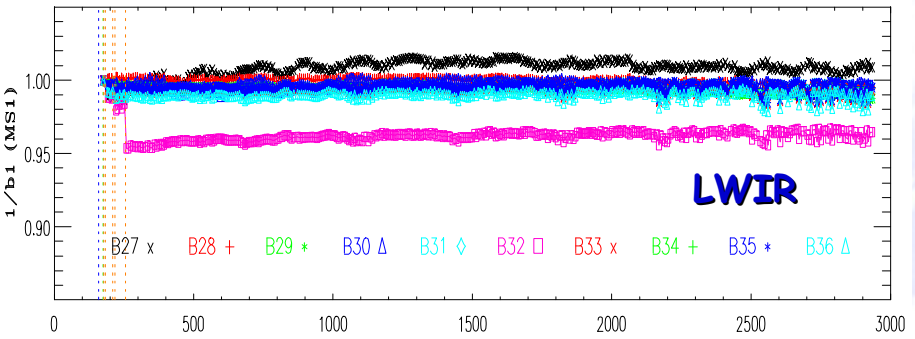
Aqua MODIS Radiometry

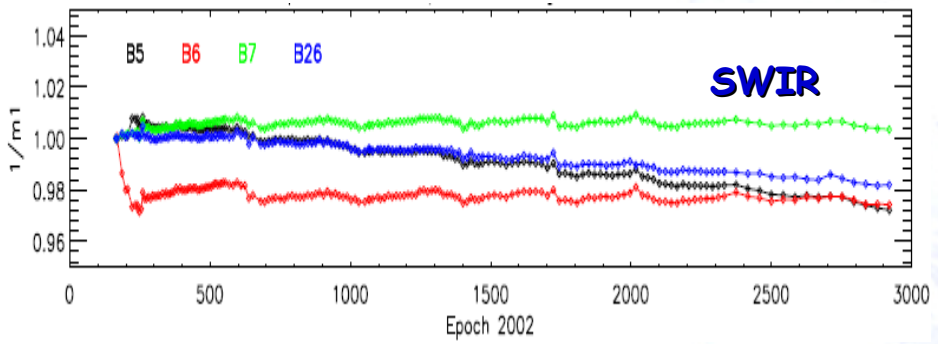
Band averaged, mirror side 1







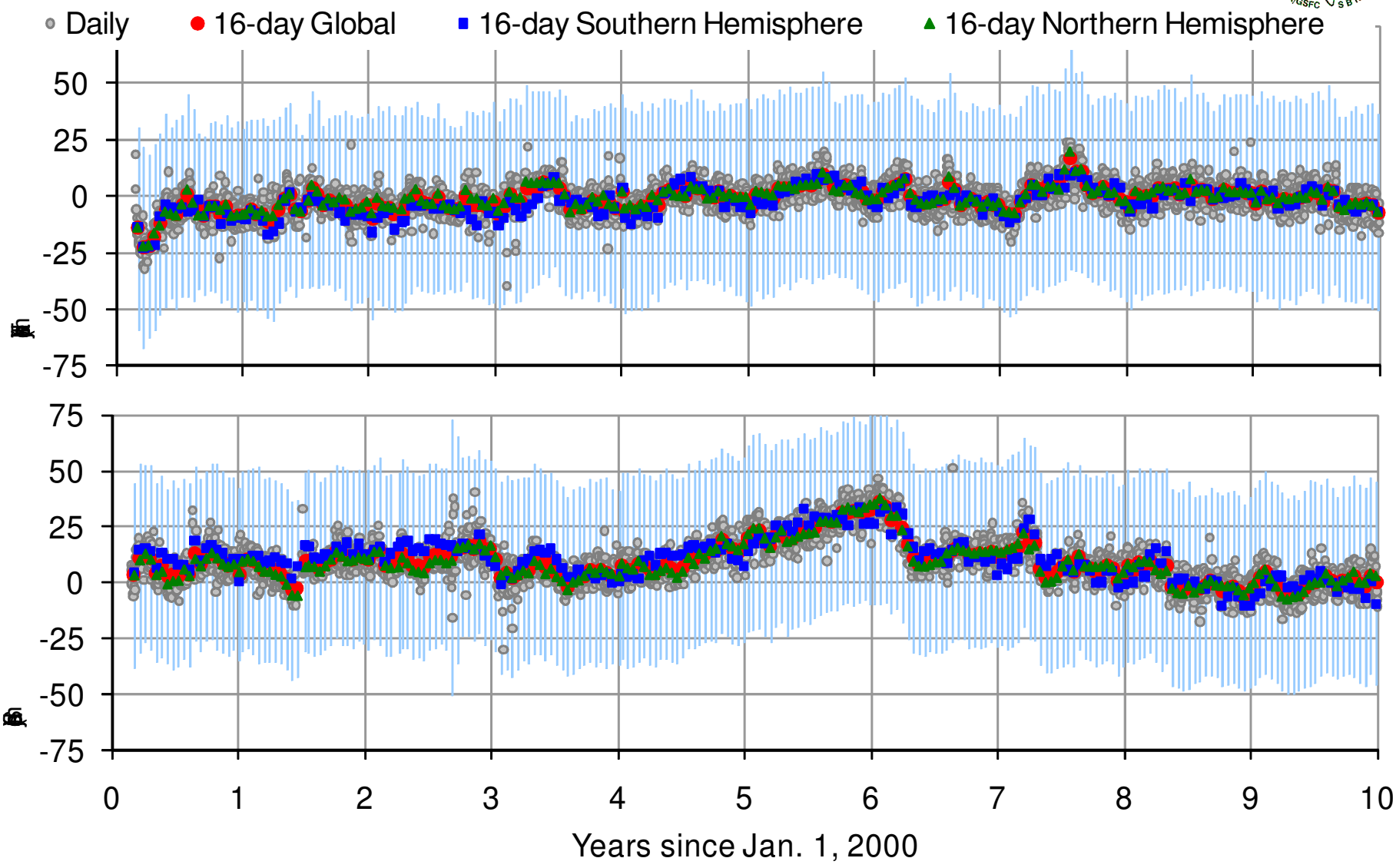




- Changes are similar to Terra MODIS but generally smaller
- Mirror side differences are much smaller

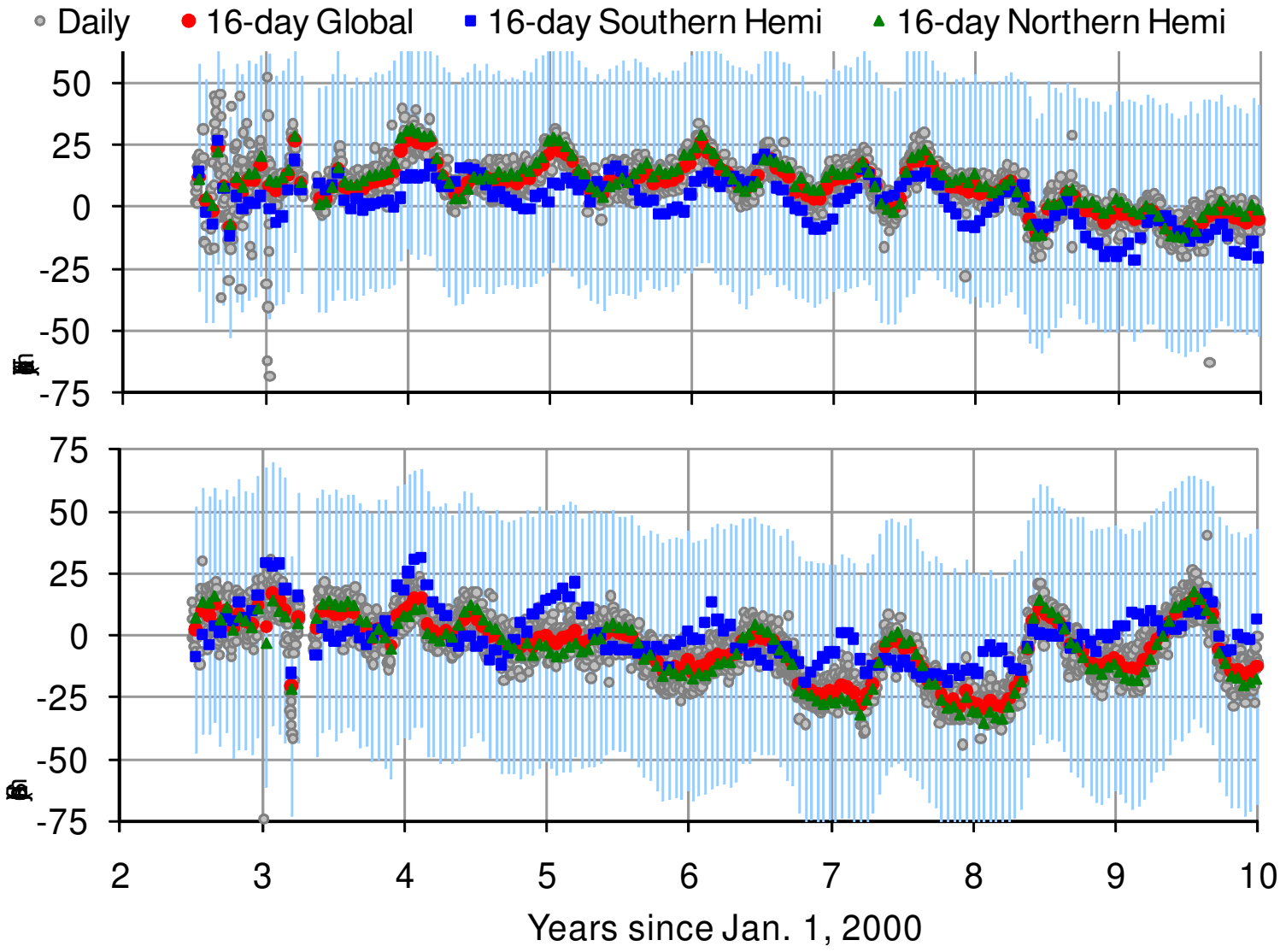
Source: Xiong et al.

Terra MODIS Geometry (C5)



Track RMS: 43m (C5) Scan RMS: 44m (C5)

Aqua MODIS Geometry (C5)



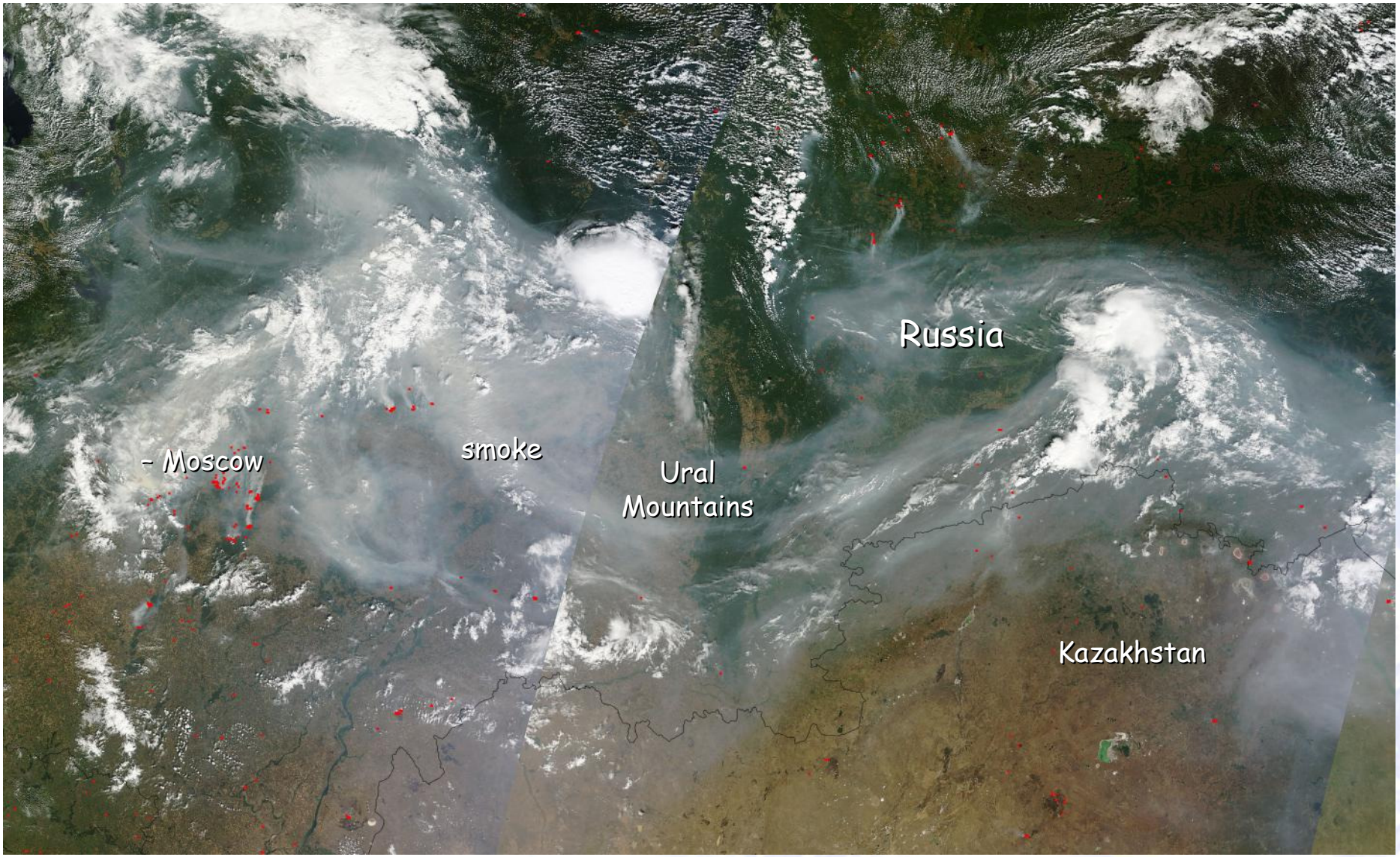
Note: northern & southern hemispherical differences

Track RMS: 47m (C5) Scan RMS: 53m (C5)

Instrument Performance Summary

- Both instruments continue to operate normally
  - Instrument and focal plane temperatures are nominal
  - Aqua MODIS cooler margin slowly decreasing
  - Known lifetime limiting issue is on-board fuel – expected to last until ~2017
- All on-board calibrators continue to provide their designed functions
  - Terra MODIS SD door fixed at the “open” position (July 2, 2003)
  - Excellent geo-location accuracy and stability
- Calibration concerns/challenges
  - Large optics (mirror and SD) degradation at short wavelengths
  - Changes in response versus scan-angle (RVS) and polarization parameters for the VIS spectral bands (8, 9, 3, and 10)

Recent Russian Smoke and Fires

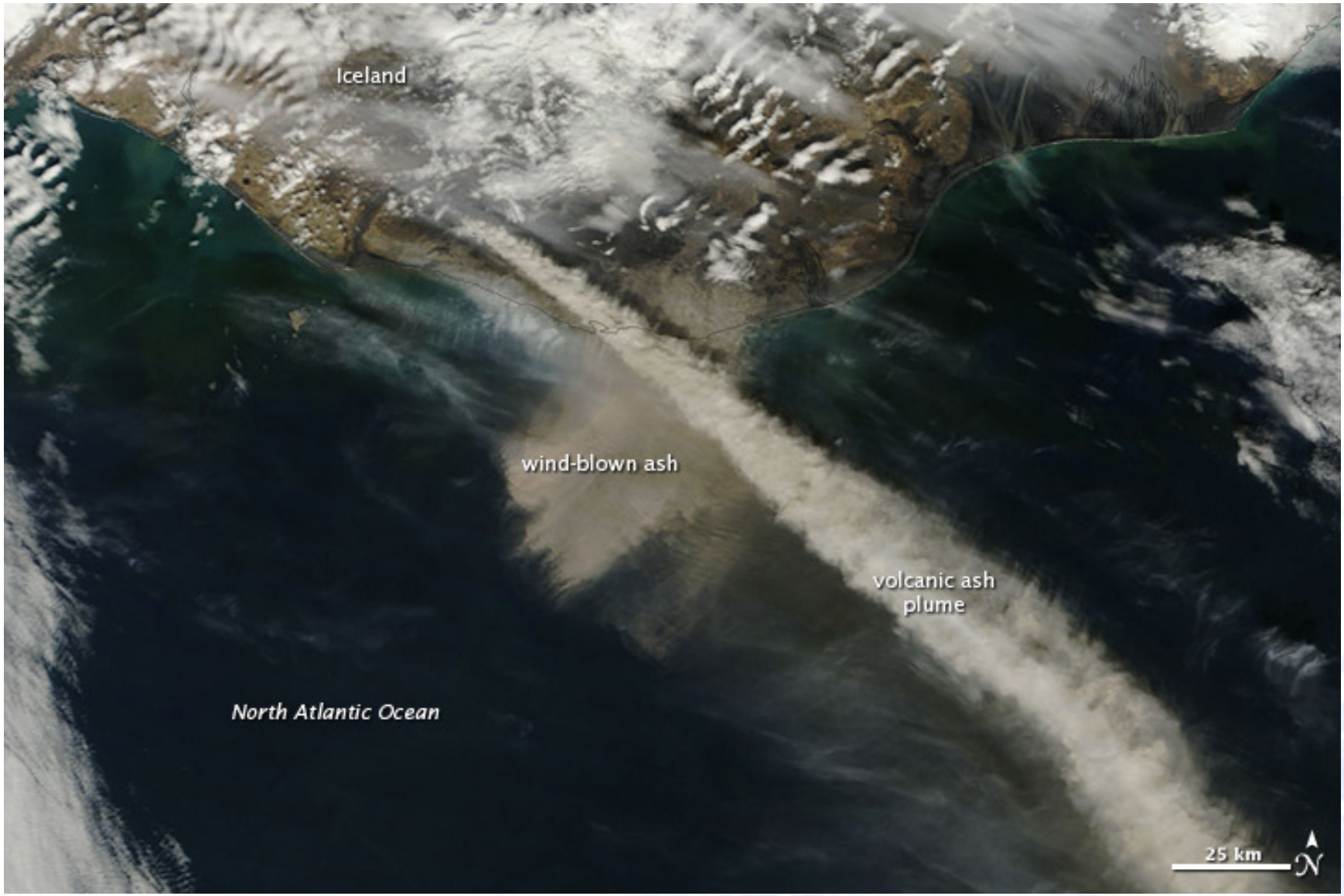


MODIS Terra, Acquired Aug. 3, 2010, Source: MODIS Daily Image

Processing Status

- Collection 5 (C5) Forward processing
  - Terra (almost all) and Aqua (all) L1B data now on-line
  - Typically 1-2 days behind real-time
  - New Near Real-time LANCE system producing L2 products within 3 hours
  - The C4.1 LST (C4 code with C5 L1 input) will be processed for all of C5
  - C5 products will be generated through the completion of C6 reprocessing
- Collection 6 Reprocessing
  - L1 and Cloud Mask – will start in Sept. 2010 and complete in Jan. 2011
  - Land production – will start in March 2011 and complete in fall of 2011
  - Recommend: C5 products be kept after C6 production completes

Eyjafjallajökull Eruption, Iceland

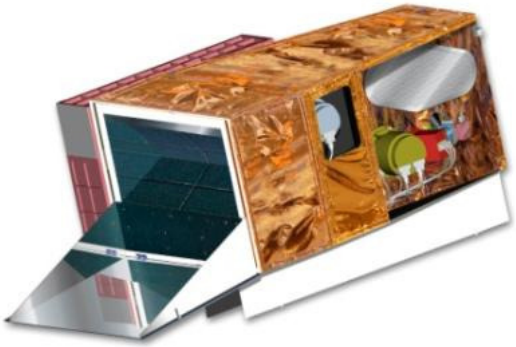


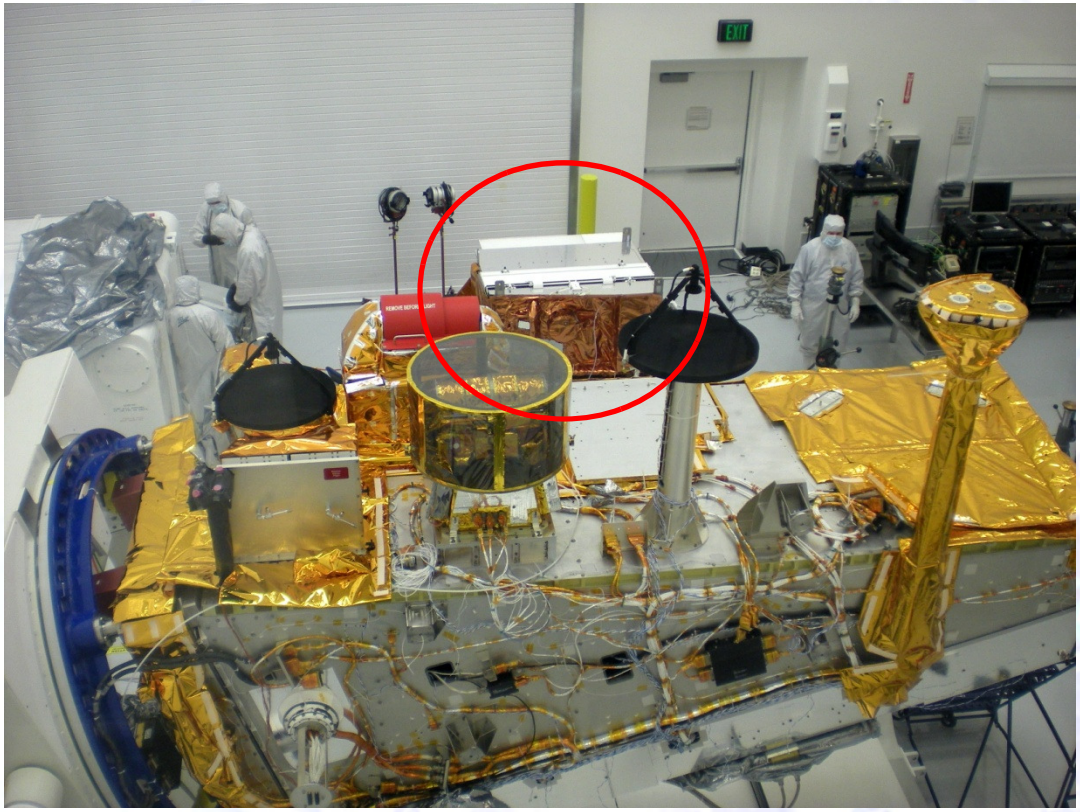
MODIS Terra, Acquired May 7, 2010, Source: Earth Observatory

VIIRS

- VIIRS was integrated with spacecraft earlier this year
  - VIIRS Performance Testing on Spacecraft: Gain, Relative Spectral Response, End-to-End (NIST)
- Expected launch date: October 2011 (dependent on ground system readiness)

VIIRS in Clean Room with NPP





VIIRS EDR Performance: IPO Requirements

- For most of the EDRs which are not dependent on precise multi-wavelength radiometric calibration (all the EDRs except Ocean Color and Aerosol Optical Depth), the VIIRS instrument performance is expected to be pretty good.
- The VIIRS EDRs will meet their operational performance requirements, with the exception of Ocean Color (and possibly AOD)

Source: Gleason et al.

VIIRS EDR Performance: NASA Science Requirements

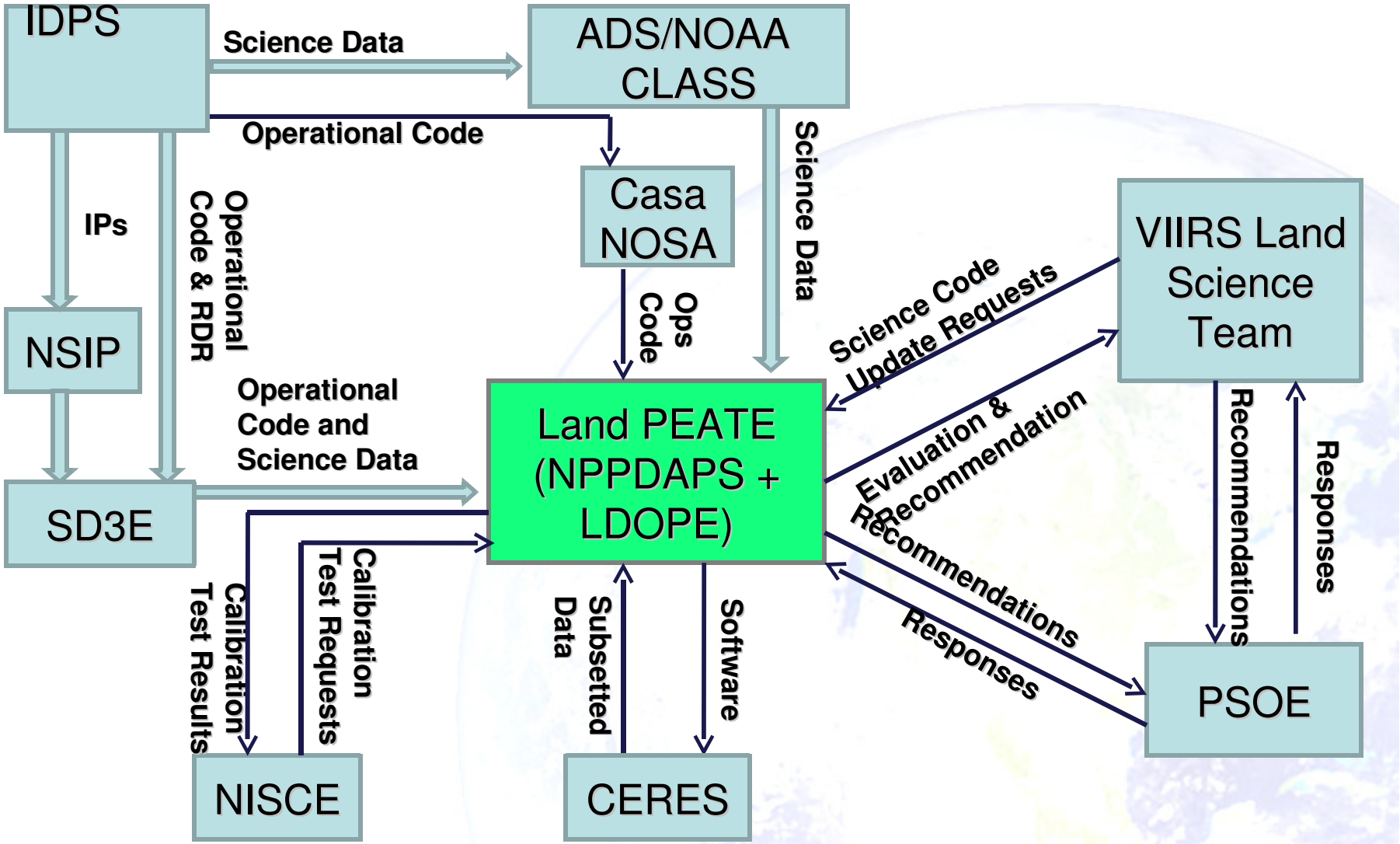
- Land: IDPS products should meet operational needs
- Land Surface Reflectance, Surface Albedo, and Vegetation Index have significant algorithmic differences with current EOS products
- Active Fires products are a special case due to instrumental differences: research product being developed for MODIS continuity

Source: Gleason et al.

Land Product Evaluation and Algorithm Test Element (LPEATE)

- Component of NASA's Science Data Segment (SDS) of the NPOESS Preparatory Project (NPP)
  - Assess the quality of the Visible Infrared Imaging Radiometer Suite (VIIRS) Land Products made by the Interface Data Processing System (IDPS)
  - Recommend improvements to the VIIRS Land science algorithms.
- Uses NPP Data Processing System (NPPDAPS) for production of data and Land Data Operational Product Evaluation (LDOPE) for evaluation of the data products.
  - NPPDAPS is a version of the MODIS Adaptive Processing System (MODAPS) modified to make products from the IDPS operational code and software provided by the science teams.
  - LDOPE Team adopts the MODIS Land QA approach to evaluate the quality of the VIIRS Land Products.
- Uses VIIRS Proxy data (based on MODIS/Aqua) as input in the pre-launch testing of the algorithms.
  - MODIS and other data is used for comparison in the NPP post-launch era.

Interface of Land PEATE with SDS Elements and External Segments



IDPS OPS Code Integration at Land PEATE

- 2 types of algorithms integrated to NPPDAPS
  - IDPS Operational code (OPS) developed at the IDPS by porting the Science code developed by the Northrop Grumman Aerospace Systems (NGAS) science algorithm team to run on IDPS
  - Science Team (ST) code developed by the VIIRS Land science teams
- Diagnostic Data Records
  - VIIRS equivalent of the MODIS Level 3 daily and multi-day gridded products.
  - MODIS C5 code modified to use VIIRS xDRs (Sensor Data Records, Environmental Data Records)
  - Facilitates comparison and trending between the two instruments

Questions/Comments?